

WHAT IS CLAIMED IS:

1. An air intake system for a multi-cylinder engine comprising,
a common intake passage for supplying the intake air to a combustion chamber of each cylinder,

a plurality of individual intake passages branching off from said common intake passage so as to supply intake air to the combustion chamber of each cylinder,

a rotary-type throttle valve provided for each of the individual intake passages, including a valve body in a circular shape when viewed along its rotational axis which defines a space as a part of the intake passage, and being capable of linearly controlling the amount of intake air supplied into the combustion chambers, wherein,

each of said individual intake passages are formed out of a plurality of branched intake passages which supply intake air to said throttle valve, and

said throttle valve is designed so that the rotational movement of said throttle valve selectively achieves a first state where intake air is supplied through a part of said branched intake passages with the remaining passages substantially blocking the intake air supply into the combustion chamber, or a second state where intake air is supplied through all of said branched intake passages.

2. The air intake system for a multi-cylinder engine claimed in claim 1,

wherein the inside of said throttle valve is formed with a first in-valve intake passage which is adapted to communicate a part of said branched intake passages with the combustion chamber, and a second in-valve intake passage which is adapted to communicate said remaining branched intake passages with the combustion chamber.

3. The air intake system for multi-cylinder engine claimed in claim 2,

wherein said throttle valve is positioned so that its rotational axis is in parallel with the engine crankshaft, the first in-valve intake passage and the second in-valve intake passage are positioned adjacently with respect to the rotational axis, and a downstream portion of the individual intake passage from an opening of each in-valve intake passage is arranged so as to direct along the tangential direction of a cylinder bore when viewed from above with respect to the vertical direction of the engine.

4. The air intake system for a multi-cylinder engine claimed in claim 2, wherein the first in-valve intake passage and the second in-valve intake passage are arranged adjacently with respect to the rotational axis direction of the throttle valve, and the transition from the first state to the second state caused by the rotation of the throttle valve is achieved in such a manner that:

from the first state where the communication is fully achieved between the first in-valve intake passage and the individual intake passage at the downstream of the first in-valve intake passage and the communication is fully blocked between the second in-valve intake passage and the individual intake passage downstream of the second in-valve intake passage, the communicative opening is gradually increased between the second in-valve intake passage and the individual intake passage downstream of the second in-valve intake passage, thereby attaining the second state.

5. The intake air system of a multi-cylinder internal combustion engine claimed in claim 1,

wherein a volume chamber is formed in a portion where the common passage and the individual passage are connected with each other.

6. A air intake system for multi-cylinder engine comprising, a common intake passage for supplying intake air to a combustion chamber of each cylinder,

a plurality of individual intake passages branching off from said common intake passage so as to supply the intake air to the combustion chamber of each cylinder,

a rotary-type throttle valve provided for each of the individual intake passages, including a valve body in a circular shape when viewed along its rotational axis which defines a space as a part of an intake passage, and being capable of linearly controlling the amount of intake air supplied into the combustion chambers, wherein, said individual intake passage comprises a low-speed branched intake passage and a high-speed branched intake passage which supply the intake air to said throttle valve, the inside of said valve body of the throttle valve is formed with an in-valve low-speed passage which is adapted to communicate said low-speed branched intake passage with the combustion chamber, and an in-valve high-speed

passage which is adapted to communicate said high-speed branch intake passage with the combustion chamber; and

a control means for controlling the opening of the throttle valve in accordance with the engine operational condition so that said low-speed branch passage and said in-valve low-speed passage are in communication with each other when the engine rotational speed is low, and the high-speed branch passage and the in-valve high-speed passage are in communication with each other when the engine rotational speed is high, and said in-valve low-speed passage is designed so as to be in full communication with said low-speed branch passage during the high speed operation.

7. The intake air system for the multi-cylinder internal combustion engine claimed in claim 6,

wherein said in-valve low-speed passage is defined by inner walls which are oppositely arranged in the valve body and are in parallel with the rotational axis of the throttle valve, and the central portions of said inner walls with respect to the direction of the intake flow are formed into a convex shape such that the central portions are closer to the rotational axis than the upstream end and the downstream end of the inner walls with respect to the intake flow.

8. The intake air system of a multi-cylinder internal combustion engine claimed in claim 6,

wherein a volume chamber is formed in a portion where the common passage and the individual passage are connected with each other.